THE ARCHAEOLOGY OF BLACKSMITH SHOPS

"A smith has more to endure than any other mechanic, for if there is anything wrong about a job the smith is sure to get the blame, whether it be his fault or not" (Richardson 1978 [1889-1891]:75).

The Structure of Blacksmith Shop Archaeology

In an often cited article in *Industrial Archaeology* (1984), John Light discusses the internal arrangement of workstations within blacksmith shops, as well as archaeologically identifiable components inside and outside of the shop. Looking only at self-contained shops, Light identified four types of spaces: work area, domestic area, refuse area, and general storage area. The essential features of the site include the building itself, the forge, the bellows, the anvil, the quenching tub, the metal-forming tools, the workbench with vise, and fuel. The fuel is generally stored away from the building in order to guard against fires.

Forges may be made of any durable material such as stone or brick, which may be either dry-laid or mortared. They were generally rectangular, waist-high boxes filled with rubble and topped with firebrick or sand. A chimney may have been present on one end. Tuyeres, pipes to feed oxygen into the forge, would also be present (Light 1984). Richardson (1978 [1889-1891]) comments that the average forge stand should be 24 inches square and 20 to 22 inches high. It should be detached from the walls to facilitate getting around it. Harmon (1995) discusses two types of forges, both ranging from three to five feet square or rectangular. One is the platform forge such as the one described by Light, which may also have a wooden framework and a clay-lined hearth. The other is the table forge, which is a brick- or rock-filled, clay-lined, wooden box on four support legs. Some have a clay-covered sheet of tin beneath the hearth. Table forges are generally later than platform forges and were followed in the late nineteenth century by portable steel forges. Harmon also notes that the forge is usually found along the north wall, oriented to the cardinal directions (1995).

The bellows may have been supported by a post in the ground or could have hung from the ceiling. A post could be detected archaeologically, and the concentration of scrap metal below the bellows should be high (Light 1984). A hand-cranked blower, common in the 1880s and 1890s, could also have been used (Harmon 1995). Harmon states that the forge and air source were generally along the rear wall of the shop and that the forge would probably be in the center when bellows were used and in a corner when a blower was used. The bellows would get in the way of other activities if it were in the corner (Harmon 1995).

The anvil is found within four to five feet of the forge and may be mounted on a stump that should be visible archaeologically in the form of a pit, if the stump itself is gone. The stump would have been supported on its sides, perhaps by rocks, bricks or stakes, and may have had shock absorbing material beneath it such as springs (Light 1984)

or marble (Rotenstein 1987). The anvil would have been placed at a 90- or 180-degree angle to the forge, and its side placement would have depended on whether the blacksmith was left or right-handed (Harmon 1995). Due to the value of the anvil, it probably will not be present archaeologically. Most anvils consist of a wrought iron body with a steel face and a wrought iron horn. Those made in the United States, however, were constructed of cast steel welded to a cast iron body. In 1847, Mark Fisher perfected the method that allowed steel to be applied to the horn as well. This cast iron technique helps the anvil keep its shape better than the anvils made of the more fibrous wrought iron (Richardson 1978 [1889-1891]).

The quenching tub could have been made out of a half barrel placed near the forge and would have been set into a pit (Light 1984). It may be present archaeologically whereas a great number of tools may not be due to their value. McBride (1987) remarked that no large tools such as the anvil, mandrel, or vise were discovered during the excavation of the Griswold shop in Barton, Mississippi. All the recovered tools were either worn or broken.

The workbench was located at least four or five feet from the forge and may have filings beneath where it was placed. However, if the shop layout was changed around, the workbench's placement may be difficult to detect. It would have been placed near a window as adequate lighting was necessary, and thus pane glass may be found nearby. Bottles that would have contained acids, fluxes, and small debris such as screws, springs, and hooks may also be in the vicinity (Light 1984).

The rural nineteenth- and twentieth-century blacksmith shops in the Carolinas discussed by Harmon (1995) were normally rectangular or square buildings with one entrance. The sides measured 10 to 15 feet. Some of the shops had windows and shutters and some did not. He suggests that direct light on the forge would have made metal color, and thus temperature, determination difficult. None of the shops he investigated had chimneys (evidenced by blackened ceilings) and all of them probably had dirt floors. Shops in the southeast were frequently open on one side with an overhanging roof, such as the Davis shop near Ophir, North Carolina (Harmon 1995).

Other areas associated with the shop may include fuel bins, detected by the presence of coke, charcoal, or coal; a stock shed containing bulk parts; metal scrap piles; slag and clinker refuse; domestic refuse; and domestic areas, detected by the presence of cooking/dining implements, pipes, or gaming pieces. Paths and doorways should be free of artifacts (Light 1984). Clinker, as defined by Light (1984:61), is "chiefly a mixture of slag, fuel residue, and material from the forge and fire base, . . . the chief waste product from the forge." It is found inside and outside of the shop. He maintains that forging temperature, fuel type, the types of metal worked, and the technical skill of the smith can all be detected from the clinker. While domestic areas were located in Canadian shops that Light excavated, McBride (1987) found none at the Griswold shop. He suggests that southern shops were probably too hot, especially in the summer, for socializing inside.

The smith probably left for breaks and meals. Harmon's three shops were all located close to homes where meals would have been taken (Harmon 1995).

One might find evidence of a horseshoeing shed or area near the shop. This was the case at the eighteenth- and nineteenth-century Mermaid blacksmith shop where the presence of a shoeing shed is not surprising considering that the shop is adjacent to a stable (Catts et al. 1994). There was also a wheelwright shop located across the road.

Fuel Usage and Charcoal Production

Three types of coal fuel are used in blacksmithing: charcoal, anthracite, and bituminous. Charcoal is the best, although its cost, in terms of volume needed, and the time needed to acquire adequate combustion are drawbacks. Bituminous coal is the next choice, but impurities such as gases, oil, and earthy matter must be burned out. Anthracite is considered the least desirable because it tends to lack one or more of the characteristics essential for blacksmithing: freedom from impurities, quick ignition, and the production of intense heat (Richardson 1978 [1889-1991]).

Wigginton (1979) describes the charcoal-making process in the rural southeast. Due to the lack of local coal available in portions of the Southeast and the shortage of shipping routes, charcoal was often used in its place. Those who made the charcoal were called colliers, and they frequently resided in a charcoal burner's shack during the process in order to watch the fire carefully. The process was begun by scraping the ground surface down to subsoil between two hills. The "hogpen" or mound was then built in this "saddle" (Wigginton 1979:97).

The wood was cut into four to six foot lengths that were stacked on end in the shape of a hive. The tiers got smaller as the pile rose, and the wood was tipped slightly inward. The resulting mound could be up to 20 to 25 feet according to oral accounts, and the wood used was either oak or pine. Pine was preferred because it was easier to split. A hollow space formed by a pole or a wooden box served as the main flue in the center of the mound. The resulting mound was covered with 6 to 12 inches of pine straw and then earth. Holes were scratched into the side and a rock was placed over the main flue. The holes were then lit. These were monitored by the collier during the process to ensure that smoldering or charring was occurring instead of burning. A ladder was used to control the center flue. Covering the air intakes smothered the fire and then the fire was allowed to cool. Opening the mound before this could ignite a large fire (Wigginton 1979). It would have taken three to ten days to reduce depending on the weather and the type of wood used (Smith 1966).

Charcoal was eventually replaced by coal in the Northeast during the early nineteenth century (McBride 1987). The earliest documented coke usage is in sixteenth-century England, when a wood shortage prompted a search for new resources. Coke had almost replaced charcoal by the end of the eighteenth century. It was originally processed in the same hivelike manner as charcoal (Smith 1966). Bituminous coal had to be coked in

order to remove impurities before it could be used in the forge. Anthracite or hard coal has fewer impurities, which allows it to burn hot with little smoking, but it is not as readily available as soft or bituminous coal (Wigginton 1979). There are mentions of blacksmiths in Pennsylvania using anthracite in 1768, but it did not become widely used until 1830-1840. By 1855, anthracite had surpassed charcoal and by 1875, bituminous coal usage exceeded anthracite in iron production (Smith 1966).

Tar kilns in Sampson County were also built in mounds. They were about 30 feet in diameter, and consisted of an earth bowl lined with clay. The wood was stacked 13 to 14 feet high and covered with sod, dirt, and vegetation. Next, the kiln was heated by putting burning wood pieces inside the sod wall and moving them down gradually in order to equally distribute the heat; the wood was smoldered, not burned, to make tar ooze out. Tar drained out through a pipe in the floor. The kiln had to be properly ventilated to avoid explosion or burning. It was heated for two days before the tar emerged, and tar continued to flow for five days. After this, all of the air vents were closed in order to produce charcoal. One cord of wood produced nearly 40 gallons, or 160 to 180 barrels, of tar that could be sold for $1.15 per barrel in 1849 (Bizzell 1983).

Blacksmiths and Society

Blacksmith shops were frequently located along public roads or near intersections for easy access (Harmon 1995). Light (1984) comments that a smithy on a navigable river will have better access to metal than a landlocked one, and thus one would see more metal reuse inland. The Clear Run shop was located along the Black River. This was an essential transportation route to and from the port of Wilmington that was also of key importance in the movement of naval stores from Sampson County. The riverboat era peaked from 1870-1914 (Butchko 1985). After this, the duties of the blacksmith shop may have changed. McBride (1987) discusses the evolution of the blacksmith as factory-made items gradually replaced shop-made ones through the nineteenth century. By the very late nineteenth century and early twentieth century, most smiths had to become farriers and then simple mechanics to survive.

Blacksmith shops were frequently turned into automotive shops later on, as evidenced by the automotive parts found at the Harrison shop in the Uwharrie National Forest, North Carolina (Harmon 1995), and at the Magic Mountain shop in Cobb County, Georgia. The latter was constructed in 1941 and was part of a general store. The author points out that it illustrates the conservative behavior associated with southern culture in terms of the recycling of tools and the building (Rotenstein 1987). The Harrison shop also had shoe parts that might indicate that it had also been a cobbler's shop at one time.

Light (1984) creates some research objectives that may be applied to the excavation of blacksmith shops. Questions that one can ask include: What was made or repaired for the community? What tools were employed? How was the work accomplished and in what type of environment? Was the smith a specialist (i.e., a farrier

or gunsmith)? The economic health and social relationships of the community may also potentially be explored, depending on records and archaeological evidence available.

The blacksmith was frequently the local jack-of-all-trades in a village, as evidenced by the array of materials present in their shops. Abandoned before 1941, the Harrison shop contained metal fittings and equipment pertaining to farming (plow and hoe blades, a mule shoe, harness buckles), coopering (barrel bands), wagon repair (wheel rims, square-headed nuts and bolts), logging (probable boiler fragments), and other miscellaneous items as well as the above mentioned automotive and shoe parts (Harmon 1995). Blacksmiths could also be skilled in woodworking and were frequently the wagon makers in their community. In addition, they fixed wooden tool parts and ox yokes (Wigginton 1979).